Name:

at1119paper: Complete the Square, $b =$ odd (v503)

Example

By completing the square, find both solutions to the given equation:

$$x^2 - 37x = -312$$

Add $\left(\frac{-37}{2}\right)^2$, which equals $\frac{1369}{4}$, to both sides of the equation.

$$x^2 - 37x + \frac{1369}{4} = \frac{121}{4}$$

Factor the left side.

$$\left(x + \frac{-37}{2}\right)^2 = \frac{121}{4}$$

Undo the squaring.

$$x + \frac{-37}{2} = \frac{-11}{2} \quad \text{or} \quad x + \frac{-37}{2} = \frac{11}{2}$$
$$x = \frac{37 - 11}{2} \quad \text{or} \quad x = \frac{37 + 11}{2}$$
$$x = 13 \quad \text{or} \quad x = 24$$

Question 1

By completing the square, find both solutions to the given equation:

$$x^2 - 43x = -462$$

$$x^2 - 43x + \frac{1849}{4} = \frac{1}{4}$$
$$\left(x + \frac{-43}{2}\right)^2 = \frac{1}{4}$$

$$x + \frac{-43}{2} = \frac{-1}{2} \quad \text{or} \quad x + \frac{-43}{2} = \frac{1}{2}$$
$$x = \frac{43 - 1}{2} \quad \text{or} \quad x = \frac{43 + 1}{2}$$
$$x = 21 \quad \text{or} \quad x = 22$$

Question 2

By completing the square, find both solutions to the given equation:

$$x^2 - 5x = 266$$

$$x^2 - 5x + \frac{25}{4} = \frac{1089}{4}$$

$$\left(x + \frac{-5}{2}\right)^2 = \frac{1089}{4}$$

$$x + \frac{-5}{2} = \frac{-33}{2} \quad \text{or} \quad x + \frac{-5}{2} = \frac{33}{2}$$

$$x = \frac{5 - 33}{2} \quad \text{or} \quad x = \frac{5 + 33}{2}$$

$$x = -14 \quad \text{or} \quad x = 19$$

Question 3

By completing the square, find both solutions to the given equation:

$$x^2 + 15x = 76$$

$$x^2 + 15x + \frac{225}{4} = \frac{529}{4}$$

$$\left(x + \frac{15}{2}\right)^2 = \frac{529}{4}$$

$$x + \frac{15}{2} = \frac{-23}{2} \quad \text{or} \quad x + \frac{15}{2} = \frac{23}{2}$$

$$x = \frac{-15 - 23}{2} \quad \text{or} \quad x = \frac{-15 + 23}{2}$$

$$x = -19 \quad \text{or} \quad x = 4$$